

A Model for the Satellite Neutral Atmosphere Source, from Sublimation

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The magnitude of the neutral atmosphere source from sublimation of the satellite surface is calculated for Ganymede and Europa using a satellite thermal model. The source is used as input to an atmospheric photochemical model to provide water group ion production rates at the satellite exobase. The thermal model is an integration of the 1-D heat conduction equation subject to a surface boundary condition. The temperature distribution on the satellite surface, and the corresponding neutral water production rates, are calculated as a function of latitude and local hour angle. Surface brightness temperatures from the Galileo PPR experiment as well as albedo variations from the Galileo NIMS experiment are used to constrain the thermal model. The photochemical model employs a diffusion factor to simulate the effects of a corotation wind upon the photochemical ion production, and accounts for surface reactions. Temperature measurements from the Galileo PLS experiment are used with the temperature dependent reactions of the photochemical model.